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# THE TECHNIQUE OF VACCINATION.

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OF NEW BEDFORD.

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THE HISTORY OF  
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## THE TECHNIQUE OF VACCINATION.

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I HAVE collected a few statistics in regard to the manner of performing the operation of vaccination in different localities.

I have answers to a list of questions on this subject from the health officers of ninety-nine of the largest cities in the United States and Canada.

*Question 1.* Have you any prescribed rules in regard to the manner of performing the operation of vaccination?

I find twelve cities have such rules, while eighty-seven have no prescribed regulations and the matter is left to the physicians who are detailed for this work.

*Question 2.* Is it the custom of vaccinators in your city to wash the skin before vaccinating?

In thirty-nine cities it is the custom to wash the skin; in sixty cities this is not done.

*Question 3.* Are any other antiseptic precautions used?

There were eighty-eight negative and eleven affirmative answers to the question, and in only four cities is it the custom to use any antiseptic solution. The other seven affirmative answers referred to the cleaning of instruments.

*Question 4.* At how many points is the virus inserted?

In fifty-one cities it is the custom to vaccinate at one point; in twenty-six cities at two points; in eleven cities at one or two points; in three cities at three points; in one



at four points ; in one at five points ; in one at one to four points ; in one at two to five points, and in two the answer was variable.

The cities where it is the custom to vaccinate at one point include Chicago, New York, San Francisco, Philadelphia, Washington, New Orleans, Brooklyn, Detroit, New Haven, Portland, Me., Richmond, Va., Lowell and Lynn, Mass.

It is the custom to vaccinate at two points in Quebec, St. Louis, Milwaukee, Pittsburg, Pa., Worcester, Mass., Savannah, Ga. At three points in Boston, Providence, and Toronto, Canada. In St. Paul, Minn., two to five insertions are made, and at Minneapolis, Minn., five.

*Question 5.* Is any bandage or dressing used to protect the point of inoculation ?

In seventy cities no bandage or dressing is used. In only twenty-two is it the custom to apply one, and in seven it is sometimes used.

*Question 6.* Have you in your experience seen septic infection follow vaccination ? In what proportion of cases does septic trouble follow vaccination ?

To the first part of the question sixty-two had never seen septic infection follow vaccination, while twenty-six answers were in the affirmative. The statements in regard to the proportion of cases in which septic trouble occurs varied very much from five per cent. in Allentown, Pa., and three cases in three hundred and fifty in Newton, Mass., to one case of erysipelas in 30,000 in Providence, R. I.

Vaccination in England is controlled entirely by an act of the Privy Council, and is under the direct supervision of the Local Government Board. The public vaccinators are appointed by the guardians of the poor in the different parishes. The rules require the careful registration of all cases and the results in each case. In all primary vaccina-

tions such insertions of lymph must be made as will produce at least four separate good sized vesicles or groups of vesicles, not less than an inch from one another. The total area of vesiculation on the same day, in the week following the vaccination, should not be less than half a square inch. The rules advise against the use of any needless means of protection or of dressing to a vaccinated arm.

I have an answer to my letter from Dr. Robinson, public vaccinator of Birmingham. He says patients must come clean, no especial washing is done. Sometimes a boracic acid solution is used. No bandage is applied. The virus is inserted at two points on each arm. He has seen sepsis from filthy clothing and from wounds other than those of vaccination. He thinks sepsis occurs in about one to five or seven hundred from unclean applications.

In Glasgow, Scotland, there are no rules. Washing is only done when plainly needed. No other antiseptic precaution is taken. The lymph is inserted at from twelve to sixteen points. No sepsis is seen except from filth.

An answer from Belfast, Ireland, states they have no prescribed rules; that it is not the custom of vaccinators to wash the skin. The virus is inserted usually at two points, but frequently at three or four. No bandage is used. Sepsis only comes from gross carelessness and filth.

In Stockholm, Sweden, there are no regulations. They wash carefully. No other antiseptic precautions are taken. Five insertions of lymph are made on each arm. No dressing is applied. They see no sepsis.

In Amsterdam, there are no rules. No washing is done or other antiseptic precaution taken except to have clean instruments. The virus is inserted at ten points. No septic infection follows vaccination.

In Antwerp, there are no regulations. Washing the skin is sometimes done, usually no other antiseptic precautions are taken. From three to six insertions are made.

A dressing is used, cotton with a light bandage. Sepsis is very seldom seen ; perhaps one case in 1,000.

In Hamburg the regulations for Germany are in force. Filthy subjects are not treated, but no washing is done. No other antiseptic precautions are taken, except to have aseptic instruments. The lymph is inserted at six points. No dressing is used. Septic infection can only come from impure lymph or from filth coming in contact with a ruptured pustule. Sepsis is very rare. Careful registration is kept of all vaccinations made and the result. The patient is required to report at the end of seven days, and anyone who does not report at the end of ten days without sufficient reason is subject to a fine.

In Berlin the regulations for Germany are in force. They sometimes wash the skin with soap and water, and sometimes with antiseptic solutions. They insert the virus at six points. They use no dressing, and see no septic trouble.

In Dresden the German regulations apply. The patients must come with clean arms and clean clothing, otherwise they are refused. The instruments used are sterilized. Three to five insertions are made on each arm. No dressing is used and no sepsis seen.

In Vienna they have the Austrian regulations. The arm is washed with soap and water, and a two per cent. solution of carbolic acid. They insert the lymph at two or three points on each arm, and use no dressing or bandage. No fatal case following vaccination is on record, but a relatively small number of cases of erythema, erysipelas or phlegmonous inflammations occur.

In all the departments of the city of Paris the vaccinating is under the direction of the Institute of Animal Vaccine. Vaccination is always done directly from the heifer to the patient.

It is a regular rule in all the Paris schools that the skin shall be washed. This precaution is becoming little by



little a custom with doctors. No other antiseptic precautions are taken. They vaccinate at two points on each arm, use no bandage, and never see sepsis.

In Lisbon, there are no rules. They seldom wash the skin and no antiseptic precautions are taken. The virus is inserted at three points on each arm. No dressing is used, and septic infection is rarely seen.

In Rome the regulations for Italy are in force. The skin is not usually washed, and the only antiseptic precaution is to use clean instruments. They vaccinate at two points on each arm. Usually no bandage is used, but sometimes a gelatine plaster is applied.

At the time of the Popes, when the humanized virus was used, syphilis was not uncommon. Now animal lymph is used no bad results are seen. Careful records are kept of the results of vaccination. The whole matter of supplying lymph is in the charge of the National Vaccine Institute. One regulation is that no one shall be allowed to use vaccine lymph that is more than ten days old.

The evidence I have collected shows important differences in the manner of performing the operation of vaccination in different localities.

Only a small proportion of public vaccinators take the precaution to wash the skin before vaccinating.

The number of points at which the vaccine lymph is inserted varies very much.

Marson's statistics based on 5,000 cases of small-pox in the London Small-Pox Hospital give the following results :

Classification of Patients affected with Small-Pox.	Number of Deaths per cent. in each class respectively.	Dr. MacCombie's statistics for 11,724 cases.	Mort. p. c.
1. Unvaccinated . . . . .	35.		
2. Stated to have been vaccinated, but having no cicatrix . . .	23.5		
3. Vaccinated:			
<i>a.</i> Having one vaccine cicatrix	7.73	{ Good, 6.4 Indifferent, 16.7	

b. Having two vaccine cicatrices . . . . .	4.70	{ Good, 3.7 Indifferent, 11.2
c. Having three vaccine cicatrices . . . . .	1.95	{ Good, 3.7 Indifferent, 7.4
d. Having four or more vaccine cicatrices . . . . .	0.55	{ Good, 2.7 Indifferent, 4.8
A. Having well-marked cicatrices . . . . .	2.52	
B. Having badly-marked cicatrices . . . . .	8.82	
4. Having had small-pox . . . . .	19.	

In patients with one well-marked vaccine cicatrix the death-rate was 3.83 per cent. Among cases where it was badly marked the death-rate was 11.91 per cent.

In patients with two well-marked cicatrices the death-rate was 2.32 per cent. Among cases badly marked 8.34 per cent.

Dr. Seaton in quoting these figures says: "In regard, therefore, to the expectation of any case of small-pox turning out badly, the question is not merely whether the patient has been vaccinated or not, but also how he has been vaccinated."

Dr. Seaton and Dr. Buchanan, during the epidemic of small-pox in London in 1863, made observations on upwards of 50,000 children in various national and parochial schools and workhouses:

Classification of Children Examined.	Proportion marked with Small-Pox per 1,000 children in each class, respectively.
1. Having no vaccine marks . . . . .	360. in 1,000
2. Vaccinated:	
a. Having one vaccine cicatrix . . . . .	6.80 in 1,000
b. Having two vaccine cicatrices . . . . .	2.49 in 1,000
c. Having three vaccine cicatrices . . . . .	1.42 in 1,000
d. Having four or more vaccine cicatrices . . . . .	0.67 in 1,000
1. Having cicatrix or cicatrices of bad quality . . . . .	7.60 in 1,000



2. Having cicatrix or cicatrices of tolerable quality . . . . .	2.35 in 1,000
3. Having cicatrix or cicatrices of excellent quality . . . . .	1.22 in 1,000

The evidence is conclusive, as Dr. Seaton states, "that the liability of any individual to take small-pox severely after vaccination, and probably the liability to take it at all, will be inversely as the goodness and amount of the vaccination."

He also says: "To produce at least four perfect vesicles, leaving four characteristic cicatrices, should be the aim of every vaccinator."

Dr. J. S. Billings writes me: "The character of the vesicle is more important than the number, but there seems to be a definite relation between the extent of surface involved in the vesicle or vesicles to the amount of protection afforded."

With such strong evidence as I have quoted in favor of multiple vaccination, it is astonishing that in fifty-one out of ninety-seven cities in the United States it is the custom to vaccinate at only one point.

It is proved by statistics that such vaccination does not give the protection from small-pox that vaccination is capable of doing.

There has been lately a great outcry against severe vaccination. This comes, perhaps, from the fact that small-pox is so uncommon, the public and physicians also have almost forgotten what a terrible disease it is. Anyone who has seen small-pox in an unvaccinated subject must hold the opinion that no vaccination can be too severe if its severity aids in protecting the individual from this disease.

In regard to a dressing, I think it much better to use one in spite of the almost universal custom of public vaccinators not to do so. It is certainly most desirable that the vesicles should not be ruptured and the crusts should be allowed to dry up: but, I think, a small dressing of

sterilized gauze and a light bandage help very much in securing this object. Any form of adhesive plaster is, I think, very injurious. Primary sepsis, that is sepsis immediately following the operation of vaccination, I believe does not occur. The bad results are all secondary, caused by the infection of broken vesicles or pustules. Such complications can be avoided if the points of inoculation be kept perfectly clean by an aseptic dressing through the whole of the process. Septic infection from vaccination is certainly surprisingly rare considering the careless way in which vaccinations are made and the cases left to take care of themselves. It is my opinion, however, that sepsis to a greater or less extent is more common than statistics show. I have noticed that the smaller cities have reported a larger proportion of cases. This may be because in the larger cities the cases are lost sight of. A careful record ought to be kept certainly of each public vaccination, and the result. This is especially important when our lymph comes to us, as it does, from private individuals and about the freshness of which there is often doubt.

In a communication from the secretary of the Local Government Board the following statement is made in regard to the occurrence of sepsis and the use of dressings after vaccination: "The official data on these matters have been stated in evidence before the Royal Commission on Vaccination which may be expected shortly to issue its report." This shows the English authorities have considered these matters of sufficient importance for investigation by a royal commission.

Except in epidemics of small-pox, children should only be vaccinated when in good health. Cutaneous eruptions of all kinds are a contra-indication.

Vaccination should be done with the same care as any minor surgical operation. The skin should be carefully washed with soap and water.

The vaccine lymph must be fresh, certainly not more than one week old.

The virus should be inserted at more than one point. The point of inoculation should be kept perfectly clean throughout the whole course of the disease, and protected from friction. The patient, meanwhile, should be considered as suffering from a mild disease.

My observations show that public vaccination in this country is not, as a rule, done as it ought to be. The question of a proper technique for vaccination is a matter of very great importance, and the whole subject needs careful investigation and revision.



